

Environmental Stewardship Resource Desk

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COVID-19

- 1. The environmental impact of mass coronavirus vaccinations: A point of view on huge COVID-19 vaccine waste across the globe during ongoing vaccine campaigns.** Hasija V, Patial S, Raizada P, Thakur S, Singh P, Hussain CM. *Sci Total Environ.* 2021 Nov 23:151881. doi: 10.1016/j.scitotenv.2021.151881. Online ahead of print.
<https://www.sciencedirect.com/science/article/pii/S0048969721069576>
The vaccine innovation is a ubiquitous preventive measure to the transmission of highly infectious SARS-COV-2. The ongoing mass coronavirus vaccination programmes have inadvertently become the bulk producers of biomedical and plastic waste triggering severe impact on the environment. The sustainable management of bio hazardous vaccine waste in particular; syringes, needles, used/un-used vials and single-use plastic equipment is of utmost importance. This perspective presents a critical point of view in terms of the generated vaccine waste and the subsequent knock-on effect on all aspects of ecosystem. The discussion includes dire consequences due to the release of huge amount of plastic-based personal protective equipment into marine environment. The pivotal crisis of CO2 emission during the manufacture and storage of different vaccines has contributed to global warming. The unavoidable generation of microfibers upon incineration, autoclaving, pyrolysis and open dumping of vaccine waste has further jeopardized the environment. In this vein, exploration of biodegradable materials for vaccine inoculation and development of green technologies for sound waste management is suggested to mitigate the environment pollution.
- 2. Managing pandemics as super wicked problems: lessons from, and for, COVID-19 and the climate crisis.** Auld G, Bernstein S, Cashore B, Levin K. *Policy Sci.* 2021 Nov 17:1-22. doi: 10.1007/s11077-021-09442-2. Online ahead of print.
<https://link.springer.com/article/10.1007/s11077-021-09442-2>
COVID-19 has caused 100s of millions of infections and millions of deaths worldwide, overwhelming health and economic capacities in many countries and at multiple scales. The

immediacy and magnitude of this crisis has resulted in government officials, practitioners and applied scholars turning to reflexive learning exercises to generate insights for managing the reverberating effects of this disease as well as the next inevitable pandemic. We contribute to both tasks by assessing COVID-19 as a "super wicked" problem denoted by four features we originally formulated to describe the climate crisis: time is running out, no central authority, those causing the problem also want to solve it, and policies irrationally discount the future (Levin et al. in *Playing it forward: path dependency, progressive incrementalism, and the "super wicked" problem of global climate change*, 2007; Levin et al. in *Playing it forward: Path dependency, progressive incrementalism, and the "super wicked" problem of global climate change*, 2009; Levin et al. in *Policy Sci* 45(2):123-152, 2012). Doing so leads us to identify three overarching imperatives critical for pandemic management. First, similar to requirements to address the climate crisis, policy makers must establish and maintain durable policy objectives. Second, in contrast to climate, management responses must always allow for swift changes in policy settings and calibrations given rapid and evolving knowledge about a particular disease's epidemiology. Third, analogous to, but with swifter effects than climate, wide-ranging global efforts, if well designed, will dramatically reduce domestic costs and resource requirements by curbing the spread of the disease and/or fostering relevant knowledge for managing containment and eradication. Accomplishing these tasks requires building the analytic capacity for engaging in reflexive anticipatory policy design exercises aimed at maintaining, or building, life-saving thermostatic institutions at the global and domestic levels.

Health Impacts of Climate Change

3. **Effects of ambient air pollution on psychological stress and anxiety disorder: a systematic review and meta-analysis of epidemiological evidence.** Trushna T, Dhiman V, Raj D, Tiwari RR. *Rev Environ Health*. 2020 Dec 18;36(4):501-521. doi: 10.1515/reveh-2020-0125. Print 2021 Dec 20.

CONTENT: A systematic bibliographic search was undertaken using PubMed, JGateplus, Google Scholar, and Cochrane Library for observational human studies published in English till 31st March 2020 reporting the effect of AAP on psychological stress and anxiety disorder. Study quality was assessed using the Joanna Briggs Institute critical appraisal tools. Meta-analysis was performed adopting a random-effects model using Meta-XL. Of 412 articles retrieved, a total of 30 articles [AAP and anxiety disorders, (n=17, 57%); AAP and psychological stress, (n=9, 30%) and AAP and both psychological stress and anxiety disorders, (n=4, 13%)] fulfilled the inclusion criteria covering a total population of 973,725 individuals. The pooled estimate (OR) of the effects of PM10 on psychological stress was 1.03 [(95% CI: 1.00, 1.05) (p=0.17, I²=41%)]. The pooled estimate of the effects of NO₂ and PM10 on anxiety disorder was 0.93 [(95% CI: 0.89, 0.97) (p=0.91, I²=0%)] and 0.88 [(95% CI: 0.78, 0.98) (p=0.01, I²=59%)] respectively. The pooled estimate of the effects of PM_{2.5} on anxiety Disorder was 0.88 [(95% CI: 0.72, 1.06) (p=0.00, I²=80%)].

SUMMARY AND OUTLOOK: The present study provides the most updated pooled estimate of the effect of AAP on psychological stress and anxiety disorder. Future studies should focus on longitudinal studies conducted in LIC and LMIC countries using uniform and standardized criteria for exposure and outcome assessment as well as robust adjustment for confounders to

minimize methodological heterogeneity resulting in reliable and comparable estimation of environmental mental health burden.

4. **Ambient air pollution and multiple sclerosis: a systematic review.** Farahmandfard MA, Naghibzadeh-Tahami A, Khanjani N. *Rev Environ Health*. 2021 Jan 4;36(4):535-544. doi: 10.1515/reveh-2020-0079. Print 2021 Dec 20.
RESULTS: Eventually, after applying the inclusion and exclusion criteria, 17 articles were included. The methodologies and outcomes reported were heterogeneous and different metrics had been used in the results; therefore conducting a meta-analysis was not possible. Eight studies had analyzed the relation between particulate matter (PM) and the prevalence or relapse of MS and had observed a significant relation. NO₂ and NO_x were associated with recurrence or prevalence of MS in three studies. But, in three cohort studies, no association was observed between air pollution and recurrence or occurrence of MS.
CONCLUSIONS: The results of this systematic review show that outdoor air pollution, especially PM and nitrogen oxides might be related to the prevalence or relapse of MS.
5. **The Role of Environmental PM(2.5) in Admission Acute Heart Failure in ST-Elevation Myocardial Infarction patients - An Observational Retrospective Study.** Sinkovic A, Markota A, Krasevec M, Suran D, Marinsek M. *Int J Gen Med*. 2021 Nov 18;14:8473-8479. doi: 10.2147/IJGM.S340301. eCollection 2021.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8608240/>
RESULTS: Acute admission HF was observed in 34.5% of STEMI patients. PPCI was performed in 87.1% of acute admission HF patients and in 94.7% non-HF patients (p= 0.037). Significant independent predictors of acute admission HF were prior diabetes (OR 2.440, 95% CI 1.100 to 5.400, p=0.028), admission LBBB (OR 10.190, 95% CI 1.160 to 89.360, p=0.036), prior resuscitation (OR 2.530, 95% CI 1.010 to 6.340, p=0.048), admission troponin I ≥5µg/l (OR 3.390, 95% CI 1.740 to 6.620, p<0.001), admission eGFR levels (0.61, 95% CI 0.52 to 0.72, p < 0.001), and levels of PM_{2.5} ≥20 µg/m³ (OR 2.140, 95% CI 1.005 to 4.560, p=0.049) one day before admission.
CONCLUSION: Temporary short-term increase in PM_{2.5} levels (≥20 µg/m³) one day prior to admission in an area with mainly good air quality was among significant independent predictors of acute admission HF in STEMI patients.
6. **Are climate change and mental health correlated?** Ramadan AMH, Ataallah AG. *Gen Psychiatr*. 2021 Nov 9;34(6):e100648. doi: 10.1136/gpsych-2021-100648. eCollection 2021.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8578975/>
Climate change is one of the biggest challenges of our time and is likely to affect human beings in substantial ways. Recently, researchers started paying more attention to the changes in climate and their subsequent impact on the social, environmental and economic determinants of health, and the role they play in causing or exacerbating mental health problems. The effects of climate change-related events on mental well-being could be classified into direct and indirect effects. The direct effects of climate change mostly occur after acute weather events and include post-traumatic stress disorder, anxiety, substance abuse disorder, depression and even suicidal ideation. The indirect effects include economic losses, displacement and forced

migration, competition over scarce resources and collective violence. The risk factors for developing those mental health issues include young age, female gender, low socioeconomic status, loss or injury of a loved one, being a member of immigrant groups or indigenous people, pre-existing mental illness and inadequate social support. However, in some individuals, especially those undisturbed by any directly observable effects of climate change, abstract awareness and acknowledgement of the ongoing climate crisis can induce negative emotions that can be intense enough to cause mental health illness. Coping strategies should be provided to the affected communities to protect their mental health from collapse in the face of climate disasters. Awareness of the mental health impacts of climate change should be raised, especially in the high-risk groups. Social and global attention to the climate crisis and its detrimental effects on mental health are crucial. This paper was written with the aim of trying to understand the currently, scientifically proven impact of climate change-related disasters on mental health and understanding the different methods of solving the problem at the corporate level, by trying to decrease greenhouse gas emissions to zero, and at the individual level by learning how to cope with the impacts of those disasters.

7. **Physical Activity in Polluted Air-Net Benefit or Harm to Cardiovascular Health? A**

Comprehensive Review. Hahad O, Kuntic M, Frenis K, Chowdhury S, Lelieveld J, Lieb K, Daiber A, Münzel T. *Antioxidants (Basel)*. 2021 Nov 8;10(11):1787. doi: 10.3390/antiox10111787.

<https://www.mdpi.com/2076-3921/10/11/1787>

Both exposure to higher levels of polluted air and physical inactivity are crucial risk factors for the development and progression of major noncommunicable diseases and, in particular, of cardiovascular disease. In this context, the World Health Organization estimated 4.2 and 3.2 million global deaths per year in response to ambient air pollution and insufficient physical activity, respectively. While regular physical activity is well known to improve general health, it may also increase the uptake and deposit of air pollutants in the lungs/airways and circulation, due to increased breathing frequency and minute ventilation, thus increasing the risk of cardiovascular disease. Thus, determining the tradeoff between the health benefits of physical activity and the potential harmful effects of increased exposure to air pollution during physical activity has important public health consequences. In the present comprehensive review, we analyzed evidence from human and animal studies on the combined effects of physical activity and air pollution on cardiovascular and other health outcomes. We further report on pathophysiological mechanisms underlying air pollution exposure, as well as the protective effects of physical activity with a focus on oxidative stress and inflammation. Lastly, we provide mitigation strategies and practical recommendations for physical activity in areas with polluted air.

WE ACT

8. **The 2019 Conference on Health and Active Transportation: Research Needs and**

Opportunities. Berrigan D et al. *Int J Environ Res Public Health*. 2021 Nov 11;18(22):11842. doi: 10.3390/ijerph182211842.

<https://www.mdpi.com/1660-4601/18/22/11842>

This paper describes the results of the December 2019 Conference on Health and Active Transportation (CHAT) which brought together leaders from the transportation and health disciplines. Attendees charted a course for the future around three themes: Reflecting on Innovative Practices, Building Strategic Institutional Relationships, and Identifying Research Needs and Opportunities. This paper focuses on conclusions of the Research Needs and Opportunities theme. We present a conceptual model derived from the conference sessions that considers how economic and systems analysis, evaluation of emerging technologies and policies, efforts to address inclusivity, disparities and equity along with renewed attention to messaging and communication could contribute to overcoming barriers to development and use of AT infrastructure. Specific research gaps concerning these themes are presented. We further discuss the relevance of these themes considering the pandemic. Renewed efforts at research, dissemination and implementation are needed to achieve the potential health and environmental benefits of AT and to preserve positive changes associated with the pandemic while mitigating negative ones.

[Lancet Planetary Health](#) – *open-access, interdisciplinary journal focused on sustainability*

News & Commentary

[Earth is headed for well over two degrees of warming.](#) Nature. 2021 Nov 23. doi: 10.1038/d41586-021-03507-1. Online ahead of print.

[How record wildfires are harming human health.](#) Kozlov M. Nature. 2021 Nov;599(7886):550-552. doi: 10.1038/d41586-021-03496-1.

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